U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Percina aurora, Suttkus and Thompson 1994

COMMON NAME: Pearl darter

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

X Continuing candidate

__ Non-petitioned

_X_ Petitioned - Date petition received: May 11, 2004

_ 90-day positive - FR date:

_ 12-month warranted but precluded - FR date:

_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 10/25/1999

___ Candidate removal: Former LP: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Fishes, Percidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Mississippi, Louisiana

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Mississippi/ Jackson, George, Perry Forrest, Covington, Green, Wayne, Clarke, Lauderdale, Newton

LAND OWNERSHIP

The species is believed to currently inhabit only navigable waters of the Pascagoula River drainage, under the jurisdiction of the U.S. Army Corps of Engineers. The Pascagoula River drainage includes 9,700 square miles (U.S. Army Corps of Engineers 1987) with a wide variety of land uses. Much of the area is in private ownership and agricultural production. The U.S. Forest Service manages significant acreage in Desoto National Forest, however less than 5 river miles are frontage land. The Nature Conservancy protects 35,000 acres of the Pascagoula River watershed in Jackson County, Mississippi. While an additional 35,000 acres are under either private or public protection. The Mississippi Department of Wildlife, Fisheries and Parks manage seven wildlife management areas within the basin totaling approximately 368,651 acres that are primarily forest and wetlands (Mississippi Department of Environmental Quality 2001). Approximately 30 river miles (48.27 km) of the Pascagoula River main stem are within state lands.

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LEAD FIELD OFFICE: Jackson, Mississippi Field Office, Daniel J. Drennen, 601/321-1127, daniel_drennen@fws.gov

BIOLOGICAL INFORMATION

Species Description and Taxonomy

The Pearl darter is a small percid fish with a blunt snout, horizontal mouth, and large eyes situated high on the head, and a medial black caudal spot at the base of the caudal fin (Ross 2001). In 1994, Suttkus et al. (1994) described the Pearl darter. It was previously known as Percina sp. 3 and the Pearl River channel darter (Ross and Brenneman 1991). The Pearl darter belongs to the subgenus Cottogaster and is closely allied to the channel darter (Percina copelandi). The Pearl darter is distinguished from the channel darter by its large average body size, lack of tubercles and heavy pigmentation of breeding males, high number of marginal spines on the modified belly scales of breeding males, and fully scaled cheeks. Breeding males have two dark bands across the spinous dorsal fin, a broad, diffuse, dusky marginal band, and a pronounced dark band across the fin near its base. Breeding females are devoid of pigmentation on the ventral surface of head and body. The Pearl darter reaches a maximum standard length of 57 millimeters (mm) (2.28 inches (in)) in females and 64 mm (2.56 in) in males (Suttkus et al. 1994).

Habitat/Life History

Little is known about the specific habitat requirements of the Pearl darter. Pearl darters have been collected from gravel riffles and rock outcrops; deep runs over gravel and sand pools below shallow riffles; swift (90 centimeters per second or 35.1 inches per second), shallow water over firm gravel and cobble in mid-river channels; and swift water near brush piles. Slack (2002) found Pearl darters associated with scour holes on the inside bend of the river downstream from point bars; and substrata primarily of course sand with accumulation of detritus in troughs perpendicular to the shore line. A single post-spawning individual was collected in a deep, sluggish run over silty sand (Bart and Piller 1997).

The Pearl darter is believed to have comparable habitat requirements to the channel darter. Habitat use of the Pearl darter is likely centered on deeper runs and pools with larger substrate particle size (Schofield et al.1999). The channel darter generally inhabits rivers and large creeks in areas of moderate current, usually over sand and gravel substrates. Such conditions are often found at the lower ends of riffles or at the edges of deep channels. Seasonally, channel darters move into the slower current of pools to use the scattered rubble as spawning sites (Kuehne and Barbour 1983). Channel darters typically avoid deep sluggish pools, headwater creeks, and lacustrine/palustrine environments (Burr and Warren 1986) with insufficient current to maintain a bottom of sand or sand mixed with gravel and rock (Page 1983). Channel darters most often remain at depths approaching 1 meter (3.28 feet) during the day but move to shallow water at night (Trautman 1957). Chironomids and small crustaceans are the most important food items (Kuehne and Barbour 1983).

Suttkus et al. (1994) found Pearl darters in the Pearl and Strong Rivers in Mississippi spawning in March and April in 1969. Collection data indicated that the species probably spawned in

various locations of the Pearl River main stem and upper reaches of the middle Bogue Chitto River. In fish samples from the Pearl River, young-of-the year Pearl darters were collected in June. Females were sexually mature at 39 mm (1.56 in) standard length (SL), while males matured at 42 mm (1.68 in) SL. Five breeding males were collected from the Leaf River (Pascagoula system, Mississippi) during May in shallow water (15 cm (5.85 in)) over firm gravel and cobble in mid channel with a water temperature of 21 degrees C (69.8 degrees F) (Bart and Piller 1997). Most Pearl darters mature in one year. Sub-adult Pearl darters may migrate upstream during the fall and winter to spawn in suitable gravel reaches, and elevated river discharge during the spring aids in downstream dispersal of young of the year (Bart et al. 2001, Ross et al. 2000).

Historical Range/Distribution

The Pearl darter is historically known only from localized sites within the Pearl and Pascagoula River drainages in Mississippi and Louisiana. Examination of site records of museum fish collections from the Pearl River drainage (Suttkus et al. 1994) suggest that the darter once inhabited the large tributaries and main channel habitats from St. Tammany Parish, Louisiana, to Simpson County, Mississippi, including approximately 96 river miles of the Pearl River, 10 river miles of the Strong River, and 32 river miles of the Bogue Chitto River. Even before its description in 1994, the Pearl darter was considered rare and of conservation concern (Deacon et al. 1997) because it was uncommon, infrequently collected, and occurred in low numbers (Bart and Piller 1997). The Pearl darter was collected from only 14 percent of 716 fish collections from site specific locations within the Pearl River drainage despite annual collection efforts by Suttkus from 1958 to 1973 (Bart and Suttkus 1996, Suttkus et al. 1994). No Pearl darters have been collected in the Pearl River drainage since 1973, even though Suttkus has made 64 fish collections over the last 25 years from the Pearl River (Bart and Piller 1997). Suttkus et al. (1994) attributed the loss of the Pearl darter in the Pearl River to increasing sedimentation from habitat modification caused by removal of riparian vegetation and extensive cultivation near the river's edge.

Collection data from Bart and Piller (1997), Bart and Suttkus (1996), Suttkus et al. (1994), and Ross (2001) suggest that the Pearl darter is very rare in the Pascagoula River system. Bart and Piller (1997) examined Suttkus' work before 1974 and found that only 19 Pearl darters were collected out of 19,300 total fish in 10 Tulane University Museum of Natural History collections. Additionally, from the "Mississippi Freshwater Fishes Database", Dr. Stephen Ross (in Bart and Piller 1997) estimated the rarity of the Pearl darter within the Pascagoula drainage from 379 collections (81,514 fish specimens) since 1973, and found only one Pearl darter collected for every 4,795 specimens. Site records from museum fish collections suggest that the Pearl darter inhabited the main channels of large Pascagoula drainage tributaries from Jackson to Lauderdale counties, Mississippi, and had a historical noninclusive range of about 30 river miles of the Pascagoula River, 24 river miles of Black Creek, 48 river miles of the Leaf River, 24 river miles of Okatoma Creek, 102 river miles of the Chickasawhay River, 24 river miles of the Bouie River, and 8 river miles of Chunky Creek.

Current Range/Distribution and Population Estimate/Status

Since 1983, Pearl darters have only been found in scattered sites within approximately 144 miles of the Pascagoula drainage, including the Pascagoula, Chickasawhay, Chunky, Leaf and Bouie Rivers and Okatoma and Black Creeks resulting in a decrease of range of approximately 55 percent (compiled from Bart and Piller 1997, Ross 2001, Slack 2004). Bart and Piller (1997) made 27 ancillary collections in 1996 and 1997 from the Pascagoula drainage and collected only 10 Pearl darters at four sites. Three specimens were collected in the Leaf River at Estabutchie in the spring of 1998, whereas, in December 1998, no Pearl darters were found in the upper reaches of the Leaf River between Estabutchie and north Hattiesburg (Bart and Ross, pers. com. 1998). Slack (2004) sampled for Pearl darters in the Leaf and Chickasawhay rivers from their confluence with Pascagoula River up river to the communities of Enterprise and Hebron. Four-hundred and seven Pearl darters were counted: 66% from the Chickasawhay and 34% from the Leaf Rivers. This extended the upstream range on the Leaf River 41.5 river kilometers. Slack (2002) found Pearl darters in the Pascagoula River at the confluence with Big Black Creek (Dead Lake) and in various locations 22 km (13.7 mi) downstream of Dead Lake. The Big Black Creek site was the locality where Hildebrand collected Pearl darters in 1933 (Suttkus et al. 1994). No Pearl darters were found in selected sites of the Chunky River in 1995 and 1997 (Bart, pers. com. 1999). Suttkus et al. (1994) speculated that portions of the Leaf River and possibly the lower Black Creek might continue to support reproducing populations even though no recent collecting attempts had been made.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range. The Pearl darter is vulnerable to non-point source pollution, urbanization, and changes in river geomorphology due to its localized distribution in parts of two unconnected river drainages and its apparent low population sizes.

   Non-point source pollution from land surface runoff can originate from virtually any land use activity, and may include sediments, fertilizers, herbicides, pesticides, animal wastes, septic tank and gray water leakage, oils and greases. Construction activities that involve significant earthworks typically increase sediment loads into nearby streams. Siltation sources include timber clear cutting, clearing of riparian vegetation, and mining and agricultural practices that allow exposed earth to enter streams. Practices that affect sediment and water discharges into a stream system change the erosion or sedimentation pattern, which can lead to the destruction of riparian vegetation, bank collapse, and increased water turbidity and temperature. Excessive sediments are believed to impact the habitat of darters and associated fish species, by making the habitat unsuitable for feeding and reproduction. Sediment has been shown to abrade and or suffocate periphyton, disrupt aquatic insect natural processes, and, ultimately, negatively impact fish growth, survival, and reproduction (Waters 1995).

In the Pascagoula drainage, water quality problems exist on the Leaf River from municipal runoff at Hattiesburg and dioxin contamination at New Augusta and on the Chickasawhay River from brine water releases from oil fields (U.S. Fish and Wildlife Service 1990). Permitted effluents to the Pascagoula River Basin include ammonia, chloride, sodium sulfate, toluene, cyclohexane and acetone (Environmental Protection Agency 1989). Bart and Piller (1997) noted extensive algal growth during warmer months in the Leaf and Bouie rivers, suggesting nutrient and organic enrichment. Municipal and industrial discharges into the watershed, particularly during low water, concentrate pollutants. Releases from the Leaf River Paper Mill at New Augusta affect temperature, dissolved oxygen, and pH in the lower reaches of the Leaf River. Existing housing and urbanization along the banks of the Leaf River between I-59 and Estabutchie may contribute nutrient loading through sewage and septic water effluent.

The flora and fauna of many coastal plain streams have been adversely affected by accelerated geomorphic processes, specifically headcutting caused by in-stream sand and gravel mining (Patrick et al. 1993). American Sand and Gravel (ASGC) (1995) consider the bed of the Bouie River a significant natural resource. Historically, ASGC has mined sand and gravel using a hydraulic suction dredge, which is operated within the banks of the Bouie River. Sand and gravel mining also has occurred within and adjacent to the Leaf River. Large sections of the river and its floodplain have been removed over the past 50 years resulting in the creation of very large open water areas that function as deep lake systems (ASGC 1995). Currently, only two permitted mines are operating within the Pascagoula drainage (Stan Phielling, Mississippi Geological Survey, Mining Office, pers. comm. 1998). However, due to the permit exemption category for mining of less than 4 acres and less than 1/4 mile from other mine sites, there are numerous non-permitted operators mining gravel throughout the Pascagoula and Pearl River drainages (Stan Phielling, Mississippi Geological Survey, Mining Office, pers. comm. 1998).

Hartfield (1993) and Patrick and Hartfield (1996) investigated the negative impacts of stream erosion due to headcutting on aquatic life in several Mississippi river drainages and believed that the drainages were also experiencing geomorphic instability caused by in-stream sand and gravel mining. Mining in active river channels typically results in incision upstream of the mine (by nickpoint migration) and sediment deposition downstream. The upstream migration of nickpoints or headcutting may cause undermining of structures, lowering of alluvial water tables, channel de-stabilization and widening, and loss of aquatic and riparian habitat. Geomorphic change, particularly headcutting, may cause the extirpation of riparian and lotic (flowing water) species (Patrick et al. 1993). Lyttle (1993) and Brown and Lyttle (1992) found that in-stream gravel mining reduces overall fish species diversity in Ozark streams and favors a large number of a few small fish species. Patrick et al. (1993) documented geomorphic changes that were adversely affecting the bayou darter, an endangered species endemic to the Bayou Pierre basin.

Bart and Piller (1997) attribute the decline of the Pearl darter in the Leaf and Bouie Rivers and Black Creek of the Pascagoula drainage to threats from siltation caused by unstable banks and loose and unconsolidated stream beds. Bart (pers. comm. 1999) believes that bank erosion and bar migration on the Leaf River at Eastabutchie is affecting the riffles where the only known spawning of the Pearl darter is occurring.

The confluence of the Bouie and Leaf Rivers, within the Pascagoula drainage, possibly provides significant habitat for the Pearl darter. Fish collections from this area indicate that it may be a site critical for maintaining the current population of Pearl darters. The Bouie River at the confluence with the Leaf River is considered by the city of Hattiesburg to be dammed and used as a major water supply (The Clarion-Ledger, October 28, 1998, Jackson, Mississippi; Kemp Associates, PA, 2000). Such a project would substantially alter and fragment significant occupied habitat of the Pearl darter in the Bouie River. Locality records (1997) of the Pearl darter within the gravel mine area of the Bouie River in Hattiesburg place the species within the exact vicinity of the proposed dam (Ross, pers. comm. 1998). Pearl darters have not been collected in impounded waters and are intolerable of lentic (standing water) habitats.

B. Overutilization for commercial, recreational, scientific, or educational purposes. In general, small species of fish such as the Pearl darter, which are not utilized for either sport or bait purposes, are unknown to the general public. Therefore, take of these species by the general public has not been a problem. Scientific collecting and take by private and institutional collectors are not presently identified as threats. Scientific collecting is controlled by the State through permits.

C. Disease or predation. Predation upon the Pearl darter undoubtedly occurs; however, there is no evidence to suggest that disease or natural predators threatens this species. To the extent that disease or predation occurs, it becomes a more important consideration as the total population decreases in number.

D. The inadequacy of existing regulatory mechanisms. There is currently no requirement within the scope of other environmental laws to specifically consider the Pearl darter or ensure that a project will not jeopardize its continued existence. There is insufficient information on the Pearl darter's ecology, life history, and sensitivity to contaminants to determine the effectiveness of existing environmental laws and regulations.

E. Other natural or manmade factors affecting its continued existence. The current range of the Pearl darter is restricted to localized sites within the Pascagoula River drainages. Subsequently, genetic diversity has likely declined due to fragmentation and separation of Pearl darter populations. The long-term viability of a species is founded on conservation of numerous local populations throughout its geographic range (Harris 1984). These features are essential for the species to recover and adapt to environmental change (Noss et al. 1994, Harris 1984). Interbreeding populations of Pearl darters are becoming increasingly disjunctive. This disjunct distribution makes Pearl darter

populations vulnerable to extirpation from catastrophic events, such as toxic spills, large in-stream-gravel mining projects, or changes in flow regime.

Hurricane Katrina, in August 2005, destroyed much of the urban and industrial areas along the lower Pascagoula. Many toxic chemicals from grounded and displaced boats and ships, storage facilities, vehicles, business and other sources have been reported in the waters. Initial assessment has identified several fish kills and an increase surge of organic material into the waters lowering dissolved oxygen levels. Impacts to the Pearl darter are being investigated (Slack, pers. com, 2005).

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

A focus meeting between all interested partners including the State of Mississippi met in 2003 to discuss recovery of the species. Protocol and action items were established for recovery of the species.

Techniques for the propagation of Pearl darters are being developed by Conservation Fisheries International (2003). After several attempts, spawning Pearl darters in aquaria were not successful. Husbandry of Pearl darters may be more difficult to accomplish in captivity than once believed. New brood stock is being provided in 2006. Negative husbandry information is being rectified to improve conditions in the laboratory to enhance spawning and reproductive conditions of the darter.

The State of Mississippi's' Department of Environmental Quality and Museum of Natural Science is determining the impacts of Hurricane Katrina (August 2005) on the increased amount of woody debris in the Pascagoula watershed, along with major toxic spills and reported fish kills (Slack, pers. com, 2005).

SUMMARY OF THREATS

The Pearl darter is vulnerable to non-point source pollution caused by urbanization and maintenance of associated infrastructure such as roads, roadways and bridges; changes in river geomorphology, especially head cutting ; the lack of the use of best management techniques during silvicultural and agricultural practices; and the species localized distribution in parts of two unconnected river drainages and its apparent low population sizes.

RECOMMENDED CONSERVATION MEASURES

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	**5***
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Magnitude: The Pearl darter is currently known only in specific reaches of the Pascagoula River basin. All streams within the species' range have the potential to be impacted by urbanization, agriculture, gravel mining and other terrain altering practices causing increase sedimentation, declining water quality from point and non-point source pollution and geomorphic changes.

Imminence: Federal and state water quality laws have reduced water quality threats to some degree. Impacts can be minimized with careful land and water use practices involving best management techniques and enforcement of existing laws and regulations involving water quality, quantity, and sediment and erosion control. This situation, although cumulative and intermittent, is sporadic temporally and spatially in the mentioned watersheds. Thus the threats are non-imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed**?**

Is Emergency Listing Warranted? No. Although populations of the Pearl darter have been impacted, there impacts can be corrected with careful land and water use practices involving best management practices and enforcement of existing laws and regulations involving water quality, quantity, sediment, and erosion control.

Non-point pollution threats and modification of reach geomorphology and hydrology are cumulative and gradual and the species is in no immediate danger of extinction.

DESCRIPTION OF MONITORING: The Mississippi Natural Science Museum monitors

reaches of the Chickasawhay, Leaf, Bouie and Pascagoula rivers for the Pearl darter on an annual basis. Exchange information on this species on a regular basis with Dr. Todd Slack (Mississippi Museum of Natural Science).

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Mississippi.

Indicate which State(s) did not provide any information or comments: N/A

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005
Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: Jackson, Mississippi Field Office